IEC 60364-8-2

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Low-voltage electrical installations –
Part 8-2: Prosumer's low-voltage electrical installations

Installations électriques à basse tension –
Partie 8-2: Installations électriques à basse tension du prosommateur

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LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 8-2: Prosumer's low-voltage electrical installations

FOREWORD

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International Standard IEC 60364-8-2 has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
64/2298/FDIS	64/2335/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60364 series, published under the general title *Low-voltage electrical installations*, can be found on the IEC website.

The reader's attention is drawn to the fact that Annex E lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Historically, utilities were managing the public transmission and distribution network from the point of view of having a central production adapted to demand variation, a top-down energy flow, a production/consumption balance done by integrated utility companies and with rather passive users.

The following key factors are pushing the public electricity network to change:

- the increasing number of electronic devices used daily and the growing needs as well as future needs (e.g. charging electric vehicles) will result in the structural growing of electricity consumption;
- the mediated pressure on climate change results in pressure on CO_2 emissions reduction;
- the electricity market is also quickly changing due mainly to its unbundling and deregulation, and to the greater number of intermittent renewable energy sources (global and local);
- users' expectations are also evolving as a result of an increasing need for better public networks reliability and quality, the search for better economic performance and the willingness to pro-actively manage their energy;
- technological evolution should also be considered as information and communication technology (ICT) is affordable and new energy storage solutions are emerging.

All stakeholders directly involved in the electricity generation, transmission, distribution and consumption have new expectations:

- customers are willing to reduce electrical energy costs in order to meet environment targets (renewable energy, energy efficiency) but also wish to benefit from the quality of electricity supply;

- suppliers wish to limit customer churn rate with price and service management;
- producers expect to maximize their yield of assets, to optimize their investments and to take profit from energy trading;
- the aggregator wants to create conditions suitable for new market emergence;
- the transmission system operator (TSO) aspires to a robust transmission public network and to meet regulation objectives (price and level of services), while the distribution system operator (DSO) wants to meet regulation objectives (price and level of services), to reduce costs by productivity (including meter) and to have a flexible network;
- finally, governments and regulators are willing to create a competitive and sustainable energy market.

The objective of this document is to ensure that the low-voltage electrical installation is compatible with the current and future ways to deliver safely and functionally the electrical energy to current-using equipment either from the public network or from other local sources. This document is not intended to influence all stakeholders of electricity supply on how the electrical energy should be sold and delivered.

LOW-VOLTAGE ELECTRICAL INSTALLATIONS –

Part 8-2: Prosumer's low-voltage electrical installations

1 Scope

This part of IEC 60364 provides additional requirements, measures and recommendations for design, erection and verification of all types of low-voltage electrical installation according to IEC 60364-1:2005, Clause 11, including local production and/or storage of energy in order to ensure compatibility with the existing and future ways to deliver electrical energy to current-using equipment or to the public network by means of local sources. Such electrical installations are designated as prosumer's electrical installations (PEIs).

This document also provides requirements for proper behaviour and actions of PEIs in order to efficiently obtain sustainable and safe operations of these installations when integrated into smart grids.

These requirements and recommendations apply, within the scope of IEC 60364 (all parts), for new installations and modification of existing installations.

NOTE Electrical sources for safety services including associated electrical installations and standby electrical supply systems for a secure continuity of supply, which are operated only occasionally and for short periods (e.g. monthly one hour) in parallel with the distribution grid for testing purposes, are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60364-4-41:2005, *Low-voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*
IEC 60364-4-41/AMD1:2017

IEC 60364-4-43:2008, *Low-voltage electrical installations – Part 4-43: Protection for safety – Protection against overcurrent*

IEC 60364-5-53:2001, *Electrical installations of buildings – Part 5-53: Selection and erection of electrical equipment – Isolation, switching and control*
IEC 60364-5-53:2001/AMD1:2002
IEC 60364-5-53:2001/AMD2:2015

IEC 60364-5-55:2011, *Electrical installations of buildings – Part 5-55: Selection and erection of electrical equipment – Other equipment*
IEC 60364-5-55:2011/AMD1:2012
IEC 60364-5-55:2011/AMD2:2016

IEC 60364-7-712, *Low-voltage electrical installations – Part 7-712: Requirements for special installations or locations – Solar photovoltaic (PV) power supply systems*

IEC 60364-8-1:2014, *Low-voltage electrical installations – Part 8-1: Energy efficiency*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
smart grid
electric power system that utilizes information exchange and control technologies, distributed computing and associated sensors and actuators, for purposes such as:

- to integrate the behaviour and actions of the network users and other stakeholders,
- to efficiently deliver sustainable, economic and secure electricity supplies

[SOURCE: IEC 60050-617:2011, 617-04-13]

3.2
prosumer's electrical installation
PEI
low-voltage electrical installation connected or not to a public distribution network able to operate:

- with local power supplies, and/or
- with local storage units,

and that monitors and controls the energy from the connected sources delivering it to:

- current-using equipment, and/or
- local storage units, and/or
- public distribution network

3.3
individual PEI
single consuming and/or producing electrical installation

3.4
collective PEI
several consuming electrical installations connected to the same public distribution network and sharing one common set of local power supplies and energy storage equipment

3.5
shared PEI
several consuming and/or producing electrical installations similar to an individual PEI connected to the same low-voltage public distribution network and sharing their individual power supplies and energy storage equipment between themselves

3.6
prosumer
entity or party which can be both a producer and a consumer of electrical energy

3.7
producer
<of electricity> party generating electrical energy

[SOURCE: IEC 60050-617:2009, 617-02-01]

3.8
consumer
<of electricity> entity or party which uses electricity for its own needs

3.9
electrical energy management system
EEMS
system comprising different equipment and devices in the installation for the purpose of energy management

Note 1 to entry: This equipment can be stand-alone or integrated in other larger equipment such as a home and building electronic system.

[SOURCE: IEC 60364-8-1:2014, 3.2.2, modified – “efficiency” has been deleted and Note 1 to entry has been added.]

3.10
distribution system operator
DSO
party operating a distribution system

3.11
operating mode
operation of an installation with respect to the different sources of electrical energy and to energy flow

3.12
direct feeding mode
operating mode in which the public network supplies the PEI

Note 1 to entry: Local storage units can supply current-using equipment or be charged by local power supplies and/or the public distribution network.

3.13
reverse feeding mode
operating mode in which the PEI supplies the public network

Note 1 to entry: Local storage units can supply current-using equipment and/or the public distribution network or be charged by local power supplies.

3.14
connected mode
operating mode which needs connection to the public network (direct feeding mode and reverse feeding mode)

3.15
island mode
operating mode in which the PEI is disconnected from the public distribution system, but remains energized

Note 1 to entry: An island can be either the result of the action of automatic protections or the result of a deliberate action.

[SOURCE: IEC 60050-617:2009, 617-04-12, modified – The definition has been adapted to the PEI.]

4 Interaction of smart grid and PEI

4.1 Main objectives

Both smart grid and electrical installations interact. A dynamic power demand/response concept should be implemented.

The smart grid has an impact on the electrical installations on the following aspects:

- the consideration of the user's needs taking into account the constraint of the public network;
- the design and configuration of the installation that shall allow load shedding (according to IEC 60364-8-1) and source selection by the EEMS.

The user should be able to give different inputs to the EEMS, depending on the contract with the DSO.

The consumption and production of energy from the renewable sources such as PV or wind turbines are intermittent and it is suggested to install storage capacity within the PEI if availability in island mode or isolated mode is needed, or to maximize the self-consumption in connected mode.

4.2 Safety

The implementation of the requirements provided in this document shall not impair the safety of the PEI, as required by other parts of the IEC 60364 series. In case of change from any energy supply configuration (e.g. from network supply to local power supplies) all protective measures shall continue to be operational or shall be automatically replaced by other standardized protective measures providing an equivalent level of safety.

4.3 Proper functioning

It is essential for the operation of the smart grid that the electrical installation remains reliable and available for the maximum possible time while the power quality parameters are also maximized by using appropriate protection measures and other good installation practices.

These requirements are important for the use of the island mode. It is essential for the PEI to comply with similar requirements on stability, availability and quality in island mode as for the connected mode.

4.4 Implementation of PEI

The electrical installations shall consider both the constraints from the DSO/electricity supplier and the needs expressed by the end user. An EEMS shall be implemented to combine information and/or data, from/to the DSO/electricity supplier, the availability of energy by the local sources and the user's needs.

5 PEI concept

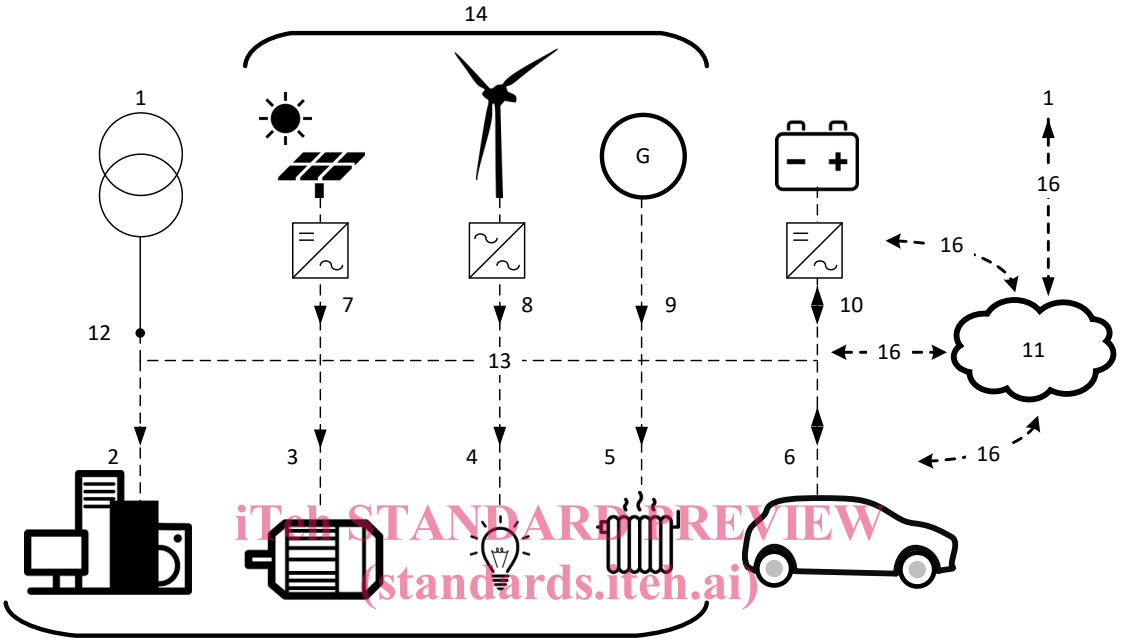
Any low-voltage PEI is to be considered as a set of electrical equipment having the following functions (see Figure 1):

- supply (e.g. connection to public power supply, local generator, photovoltaic systems, wind turbines, batteries);
- distribution (e.g. distribution panel, wiring systems);
- consumption (e.g. motors, heating systems, lighting, lifts);
- energy management (e.g. load shedding equipment, monitoring device).

NOTE A battery can be considered as a generator and as a load.

An uninterruptible power supply (UPS) is not to be considered as a prosumer when the purpose of this UPS is only to supply downstream critical loads and not to have a reverse feeding mode to supply the public network and/or current-using equipment in the upstream part of the electrical installation.

The general principles of the PEI are described in Annex A.



IEC

Key

1	Public network	9	Other generators
2	Home appliances and electronic devices	10	Electric storage
3	Motors	11	EEMS
6	Lightings	12	Origin of installation
5	Heaters	13	Local distribution
6	Electric vehicles	14	Local generation
7	Solar inverter	15	Local consumption
8	Wind inverter	16	Management signals

Figure 1 – Example of prosumer's low-voltage electrical installation

In a PEI, an installation owner may consider independently the supervision and the control of different power supplies connected to the low-voltage electrical installation in order to supply in efficient and cost-effective ways all the electrical loads connected to this low-voltage electrical installation. Connection of all power supplies shall comply with IEC 60364-5-55: 2011, Clause 551 and with IEC 60364-7-712 for photovoltaic systems.

Local production of electricity may be used locally or may be sent back through the public network. In such a case the local consumer is to be considered as a traditional consumer of electrical energy and as a producer of electrical energy (prosumer).

Interaction with the public network is described in Annex C.

6 Types of PEI

6.1 General

There are different types of PEI:

- individual (see 3.3);
- collective (see 3.4);
- shared (see 3.5).

Each type of PEI can be arranged in the different operating modes defined in 6.2.

6.2 Operating modes

The main operating modes presented in this document may be adopted for each type of PEI (individual, collective or shared). They are the following:

- direct feeding mode (see 3.12);
- reverse feeding mode (see 3.13);
- island mode (see 3.15).

Storage units can supply current-using equipment or be charged by local power supplies or by the public network, except in island mode.

Local power supplies can supply current-using equipment or local storage units or the public network, except in island mode.

Transfer from/to the direct feeding mode to island mode and vice versa can be achieved by operating the switching device for islanding; this can be either directly controlled (manually or remotely) or automatically controlled.

Switching from one mode to another can be done if the generators and/or converters are synchronized with the network (see IEC 60364-5-55:2011, Clause 551).

See Annex B for examples of operating modes.

Selection of the possible operating modes may depend on the contract with the DSO or according to the national legislation.

Technical requirements for the design of the PEI according to the selected operating mode are provided in Clause 8.

6.3 Individual PEI

An individual PEI is characterized by one electrical installation having the possibility to both consume and produce electrical energy, and with a management system for its operation.

The installation manager may decide, through the EEMS and according to the contract with the DSO, when local production of energy is to be made available, for local storage, local use or for transfer to the public network.

An example of individual PEI is provided in Figure 2.